



MISSOURI DEPARTMENT OF
**HEALTH &
SENIOR SERVICES**

Primary Amebic Meningoencephalitis

Missouri Department of Health and Senior Services sent this bulletin at 08/15/2025 01:31 PM CDT



MISSOURI DEPARTMENT OF
**HEALTH &
SENIOR SERVICES**

Health Advisory

August 15, 2025

Case of Primary Amebic Meningoencephalitis Due to *Naegleria fowleri* Infection in Missouri

Missouri healthcare providers can contact their local public health agency or the DHSS's Bureau of Communicable Disease Control and Prevention at 573-751- 6113 with questions regarding this Health Advisory.

Summary

- On August 13, 2025, the Missouri Department of Health and Senior Services (MDHSS) announced a case of primary amebic meningoencephalitis (PAM) in a Missouri resident. This is only the third such case in the state since 1983. Two of these cases, including the recently announced case, were locally acquired, and one was acquired when out of state. Testing performed by the CDC laboratories was positive for *Naegleria fowleri*, the amoeba responsible for PAM.
- The source of the patient's exposure is currently being investigated by public health officials. Preliminary information implies the patient was involved in recreational water activities at the Lake of the Ozarks days prior to becoming ill.
- PAM is extremely rare. Between 1962 and 2024, there were only 167 reported cases of PAM in the United States. Nonetheless, due to the extremely high death rate of this infection, such cases raise public concerns. This advisory was issued to provide healthcare providers with a background on PAM, as well as a reminder to consider the diagnosis in a patient who presents with fulminant meningitis and recent exposure to freshwater.
- Recreational water users should assume that *Naegleria fowleri* is present in warm freshwater across the United States; however, infection remains very rare.

Epidemiology

PAM is caused by *Naegleria fowleri*, a thermophilic, free-living amoeba that lives in temperatures above 86°F (30°C) and can tolerate temperatures up to 113°F (45 °C). This protozoan parasite is found in the soil and freshwaters, such as ponds, lakes, rivers, streams, hot springs, and unchlorinated swimming pools. Risk factors for infection include swimming, diving, waterskiing, surfing, and exposure to hot springs. The use of plain tap water for nasal irrigation, instead of the recommended sources of water recommended below, has also been reported as a risk factor for the disease.

PAM is a very rare disease with less than 10 cases reported annually to the CDC in recent years. PAM is more common in warmer regions, such as the southern part of the United States, and generally occurs in the warmer months of spring and summer, possibly due to the increased likelihood of participation in waterborne activities. Prior epidemiological studies revealed the mean age of patients affected by PAM to be 12 years (ranging from 8 months to 66 years); 79% were males. ***Naegleria fowleri* is NOT transmitted from human to human.**

The Missouri Department of Health & Senior Services (DHSS) uses four types of documents to provide important information to medical and public health professionals, and to other interested persons:

Health Alerts convey information of the highest level of importance which warrants immediate action or attention from Missouri health providers, emergency responders, public health agencies, and/or the public.

Health Advisories provide important information for a specific incident or situation, including that impacting neighboring states; may not require immediate action.

Health Guidances contain comprehensive information pertaining to a particular disease or condition, and include recommendations, guidelines, etc. endorsed by DHSS.

Health Updates provide new or updated information on an incident or situation; can also provide information to update a previously sent Health Alert, Health Advisory, or Health Guidance; unlikely to require immediate action.

Phone: 800-392-0272

Fax: 573-751-6041

Web: health.mo.gov

Pathophysiology

PAM occurs in healthy young individuals exposed to warm freshwater. *Naegleria fowleri* infects susceptible individuals when contaminated water enters the body through the nose. Trophozoites penetrate the olfactory mucosa, cross the cribriform plates, and ultimately reach the olfactory bulb and cause the inflammatory reaction and the parenchymal damage associated with PAM.

Naegleria fowleri has a 3-stage life cycle: amoeboid trophozoites, flagellate, and cysts. During an infection, *Naegleria fowleri* trophozoites are found in cerebrospinal fluid (CSF) and tissue, and occasionally, flagellated forms may be noted in the CSF. Cysts are not seen in brain tissue.

Clinical Presentation

Patients with PAM typically present acutely with fever, severe headache, photophobia, nausea, vomiting, behavioral abnormalities, seizures, and altered mental status. A history of olfactory and taste abnormalities is frequently associated with PAM. Patients with PAM usually have a history of swimming, diving, bathing, or playing in warm, generally stagnant freshwater during the **previous 1 to 9 days**. On physical examination, meningismus and cranial nerve palsies can be seen. The disease progresses rapidly with increased intracranial pressure leading to uncal herniation and death. The clinical presentation and CSF findings of PAM are very similar to acute bacterial meningitis. Therefore, **obtaining an epidemiological history in patients with suspected bacterial meningitis but negative cultures and failure to improve is extremely important**. Complications of PAM can include hallucinations, seizures, coma, and death.

In epidemiological studies, the mean time from onset of symptoms to death was 5.3 days (ranging from 1 to 12 days), and the mean time from exposure to death was 9.9 days (ranging from 6 to 17 days). Unfortunately, more than 97% of people with PAM have died from the infection. There have been only five well-documented survivors of PAM in North America.

Testing

Lumbar puncture for cerebrospinal fluid (CSF) analysis is required for the diagnosis of PAM. Laboratory findings suggestive of PAM include leukocytosis with a left shift. The CSF opening pressure is very high. The CSF white cell count ranges from 300 to 26,000 cells/mm with polymorphonuclear predominance. CSF red blood cells are usually seen, and hemorrhagic fluid is seen as the disease progresses. Hypoglycorrhachia and elevated protein are characteristic.

PAM is diagnosed by detecting *Naegleria fowleri* amebas using different tests offered by only a few U.S. laboratories, including CDC. The tests include polymerase chain reaction (PCR) test that detects *Naegleria fowleri* in a patient's CSF or tissue, immunohistochemical (IHC) testing and indirect immunofluorescent (IIF) staining that use specific antibodies against *Naegleria fowleri* to detect the ameba, and direct visualization by examining CSF under a microscope. A definitive diagnosis is made by observation of motile trophozoites on centrifuged CSF wet mount preparation.

Treatment

The optimal treatment of PAM is unknown, with a treatment duration ranging from 9 to 30 days. Considering the fulminant course of the disease and high mortality rates, a combination of drugs is generally used. The drugs found to have antiamebic activity against *Naegleria fowleri* in the laboratory and different drug combinations used in PAM survivors are available at <https://www.cdc.gov/naegleria/hcp/clinical-care/index.html>.

Missouri DHSS Recommends:

- Recreational water users should assume that *Naegleria fowleri* is present in warm freshwater
- Avoid diving and jumping into stagnant freshwater.
- Consider using nose plugs for unavoidable exposures or pinching your nose shut when diving or swimming in freshwater.
- Keep your head above water when swimming in freshwater, hot springs, and other untreated thermal bodies of water.
- When participating in water-related activities, avoid digging or stirring up the sediment.
- Use filtered, distilled, sterile, or previously boiled water for nasal or sinus irrigation, not tap water.

- Physicians who suspect they have a patient with a neurologic infection due to free-living amebae should immediately hospitalize the patient and notify the public health agency for help with case management and specimen submission

- Treatment consultation with infectious disease specialists and/or subject matter experts at CDC is strongly recommended
- Clinicians working in communities with potential exposure to large stagnant bodies of freshwater should play a role in educating patients about the risk and providing information about how to mitigate the risk

References

1. Cope JR, Murphy J, Kahler A, Gorbett DG, Ali I, Taylor B, Corbett L, Roy S, Lee N, Roellig D, Brewer S, Hill VR. Primary Amebic Meningoencephalitis Associated With Rafting on an Artificial Whitewater River: Case Report and Environmental Investigation. Clin Infect Dis. 2018 Feb 01;66(4):548-553.
2. Maciver SK, Piñero JE, Lorenzo-Morales J. Is *Naegleria fowleri* an Emerging Parasite? Trends Parasitol. 2020 Jan;36(1):19-28.
3. Graciaa DS, Cope JR, Roberts VA, Cikesh BL, Kahler AM, Vigar M, Hilborn ED, Wade TJ, Backer LC, Montgomery SP, Secor WE, Hill VR, Beach MJ, Fullerton KE, Yoder JS, Hlavsa MC. Outbreaks Associated with Untreated Recreational Water - United States, 2000-2014. MMWR Morb Mortal Wkly Rep. 2018 Jun 29;67(25):701-706.
4. Matanock A, Mehal JM, Liu L, Blau DM, Cope JR. Estimation of Undiagnosed *Naegleria fowleri* Primary Amebic Meningoencephalitis, United States¹. Emerg Infect Dis. 2018 Jan;24(1):162-164.
5. Burqi AMK, Satti L, Mahboob S, Anwar SOZ, Bizanjo M,

Rafique M, Ghanchi NK. Successful Treatment of Confirmed
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Meningoencephalitis. Emerg Infect Dis. 2024 Apr;30(4):803-
805.

For additional Information visit
health.mo.gov.

Submitted by: ERC Duty Officer, Emergency Response Center (ERC)
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MISSOURI DEPARTMENT OF
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CDC Hand 00524 Ebola Outbreak in Democratic Republic of Congo

Missouri Department of Health and Senior Services sent this bulletin at 09/18/2025 05:06 PM CDT



MISSOURI DEPARTMENT OF
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Health Advisory

September 18, 2025

Missouri healthcare providers please contact your local public health agency or the Missouri Department of Health and Senior Services' (DHSS') Bureau of Communicable Disease Control and Prevention at 573-751-6113 or 800-392-0272 (24/7) with questions regarding this CDC Health Advisory, to immediately report a patient suspected of having Ebola virus disease (EVD), or to request testing for a patient suspected of having EVD.

Summary

The Centers for Disease Control and Prevention (CDC) is issuing this Health Alert Network (HAN) Health Advisory about a new outbreak of Ebola virus disease (EVD) in the Democratic Republic of the Congo (DRC). EVD is a severe illness and is often fatal.

Currently, no suspected, probable, or confirmed EVD cases related to this outbreak have been reported in the United States or outside of the DRC. The risk of spread to the United States is considered low at this time. As a precaution, this Health Advisory summarizes CDC recommendations for U.S. public health departments, clinical laboratories, and healthcare workers about potential EVD case identification, testing, and biosafety considerations in clinical laboratories.

On September 8, 2025, CDC issued a Travel Health Notice for people traveling to the DRC. CDC recommends that all travelers to the affected health zones in DRC avoid contact with ill people during travel and monitor themselves for symptoms of EVD while in the outbreak area and for 21 days after leaving. Travelers who develop symptoms during this time should self-isolate and contact local health authorities or a clinician. At this time, CDC is not recommending additional assessments or monitoring of travelers arriving from DRC by the jurisdictional health departments unless mentioned in the existing VHF guidance provided below.

CDC's Health Advisory

For additional Information visit
health.mo.gov.

Submitted by: ERC Duty Officer, Emergency Response Center (ERC)
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MISSOURI DEPARTMENT OF
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10.27.25 DHSS HAD Health Risk Associated with 7-OH

Missouri Department of Health and Senior Services sent this bulletin at 10/27/2025 10:29 AM CDT



MISSOURI DEPARTMENT OF
**HEALTH &
SENIOR SERVICES**

Health Advisory

October 27, 2025

Health Risks Associated with 7-OH

Summary

- The recent increased availability and use of 7-hydroxymitragynine (7-OH) pose significant health risks including dependence and/or addiction.
- Reporting of adverse reactions requiring immediate clinical intervention among users of products containing 7-OH has increased.
- Isolated 7-OH is currently untested in humans, unregulated, not proven safe or effective for any use, and sold to the public without restriction.
- Until safety data is available for human consumption, Missourians are advised to avoid these products.

7-OH Background

7-OH, pronounced “seven-hydroxy,” is an abbreviation referring to the chemical compound 7-Hydroxymitragynine. It is a potent isolated psychoactive substance that exists naturally in very small amounts in the kratom plant. Both 7-OH and kratom have been marketed as “natural” promoters of alertness and remedies for pain, anxiety, and/or opioid withdrawal. However, isolated 7-OH products marketed and sold in Missouri have a far higher concentration—and therefore far higher potency—than natural kratom. Research data reveals 7-OH has 13 times the potency of morphine at the opioid receptors.

Products containing isolated concentrated 7-OH are sold in stores such as smoke shops, gas stations, convenience stores, and online shops. They can be gummies, candies, imitation ice cream cones, liquid shots, tablets or powders. It is sometimes sold as if it were the same product as kratom, but it is far more addictive.

In July 2025, the U.S. Food and Drug Administration announced steps to restrict access to 7-OH products due to its strong opioid-like effects. Kratom and 7-OH do not have an FDA-approved medical use, and products containing 7-OH have not been proven to be safe or effective. Because 7-OH is unregulated, the potency, purity, and safety of products can vary widely, making it difficult to safely gauge dosage.

7-OH Clinical Effects

Symptoms

Symptoms reported after 7-OH use include but are not limited to:

- Nausea and vomiting
- Agitation
- Confusion
- Sweating
- Anxiety
- Insomnia
- Gastrointestinal distress
- Depression
- Rapid heart rate
- High blood pressure

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- Trouble breathing
- Sleepiness or loss of consciousness
- Seizures
- Withdrawal symptoms such as restlessness, body aches, fatigue, irritability, and cold sweats
- Dependence and addiction
- Poisoning
- Death

Overdose

- Because 7-OH acts on opioid receptors, it can cause respiratory depression, overdose, and death.
- Combining 7-OH with other substances increases the risk of overdose. Using 7-OH in combination with alcohol, other sedatives, illicit substances, or certain prescribed medications can amplify the risk for severe respiratory depression, and in some cases, even death.

Poison Control

- From January 1 through September 30, 2025, the Missouri Poison Center has received 47 reports of exposures involving kratom or another product containing 7-OH, compared with 25 in 2024 and 19 in 2023.
- The Missouri Poison Center began tracking isolated 7-OH use within the last three months, with three reports of exposures to 7-OH. Of the three reported during that time, one was evaluated in a health care facility.

Treatment

- Acute overdose:
 - o Anyone who suspects an overdose should call 911 immediately and administer naloxone if available.
 - o Opioid overdose (including overdose elicited by 7-OH which targets opioid receptors in the body) can be reversed with naloxone, a medication that restores normal breathing.
 - o It is important to recognize that naloxone prevents only opioid-related overdose. If 7-OH is mixed with other drugs or alcohol, then naloxone may not fully reverse the effects of those other substances.
 - o Naloxone can be administered through the nose or as an intramuscular injection to save a person's life. Both methods are equally effective.
- Chronic Substance Use Disorder due to 7-OH Use
 - o Patients suffering from dependence or addiction to 7-OH should reach out to a healthcare provider to seek recovery support.

Missouri DHSS Recommendations

- Avoid 7-OH products.
- Read labels carefully when buying candies or supplements.
- Keep 7-OH products away from children and pets.
- Talk to children and teens about the risks of 7-OH.
- Stay informed about overdose risks and keep naloxone available in case of an emergency.
- Consult a health care provider before using any supplements, especially anything marketed for pain, energy or mood.
- Seek medical care or call the Poison Help Line at 1-800-222-1222 if you have concerns about 7-OH.
- If someone is unresponsive, nearing unresponsiveness, or acutely ill:
 - o Call 911 immediately!

- If there is not an overdose or medical emergency, seek help for 7-OH dependence or addiction:
 - o Call 988
 - o Call Missouri Dept of Mental Health (573) 751-4942 or (800) 575-7480
 - o Go online to find treatment locations, some of which are available immediately or same-day: <https://dmh.mo.gov/behavioral-health/treatment-services/locating-services-treatment>

Additional Information and Resources

- [Missouri Poison Center](#)
- [Hiding in Plain Sight: 7-OH Products](#), U.S. Food and Drug Administration
- [Time2Act – Stop Opioid Misuse in Missouri](#)
- Order FREE Naloxone at [Get MO Naloxone](#)

Please contact the DHSS's Bureau of Community Health and Wellness at 573-522-2820 with questions regarding this Health Advisory.

References

- US Food & Drug Administration, News Release (July 29, 2025), "[FDA Takes Steps to Restrict 7-OH Opioid Products Threatening American Consumers.](#)"
- Food and Drug Administration (July 29, 2025), "[Preventing the Next Wave of the Opioid Epidemic: What You Need to Know About 7-OH.](#)" <https://www.fda.gov/media/187900/download>
- Midwest High Intensity Drug Trafficking Area (HIDTA), Quarterly Drug "Hot Sheet", third Quarter, 2025. "[7- OH Bulletin.](#)"

For additional Information visit health.mo.gov.

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MISSOURI DEPARTMENT OF
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CDC HAd First Reported Outbreak Caused by Marburg Virus in Ethiopia 12/03/2025

Missouri Department of Health and Senior Services sent this bulletin at 12/03/2025 08:48 PM CST



MISSOURI DEPARTMENT OF
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Health Advisory

December 03, 2025

****Missouri healthcare providers please contact your local public health agency or the Missouri Department of Health and Senior Services' (DHSS') Bureau of Communicable Disease Control and Prevention at 573-751-6113 or 800-392-0272 (24/7) with questions regarding this CDC Health Advisory, to immediately report a patient suspected of having Marburg virus disease (MVD), or to request testing for a patient suspected of having MVD.*****

Summary

The Centers for Disease Control and Prevention (CDC) is issuing this Health Alert Network (HAN) Health Advisory to inform clinicians and health departments about a new outbreak of Marburg virus disease (MVD) in Ethiopia's South Ethiopia and Sidama regions. MVD is a severe illness that can be fatal.

No suspected, probable, or confirmed cases of MVD related to this outbreak have been reported in the United States or other countries outside of Ethiopia as of December 3, 2025. The risk of spread to the United States is considered low at this time; however, clinicians should be aware of the potential for imported cases. As a precaution, this health advisory summarizes CDC's recommendations about MVD case identification, testing, and biosafety considerations in clinical laboratories for U.S. health departments, clinical laboratories, and healthcare workers.

On November 17, 2025, CDC issued a [Level 1 Travel Health Notice](#), advising people traveling to Ethiopia to practice usual precautions. The notice advises travelers to check their health for [signs or symptoms of MVD](#) while in the outbreak area and for 21 days after leaving and take appropriate actions (isolate, avoid travel, seek health care) if they become ill. Ethiopian national authorities are increasing response activities including screening, isolation of cases, contact tracing, airport exit screening, and public awareness campaigns to curb the spread of MVD. As of December 3, 2025, CDC is not recommending additional assessments or monitoring of travelers arriving from Ethiopia by the jurisdictional health departments.

CDC's Health Advisory

For additional Information visit health.mo.gov.

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